

REMARKS

The rejection of the amendment filed 08/22/03 under 35 U.S.C. §132 is now moot in light of the cancellation of claim 11.

The rejection of claim 11 under 35 U.S.C. §112, first paragraph, is now moot in view of the cancellation of said claim.

The rejection of claims 1-7 under 35 U.S.C. §102(b) and §103(a) in view of European Patent No. 0997960 (EP '960) is respectfully traversed. The secondary battery disclosed by EP '960 does not feature a capacity component due to light metal precipitating and dissolving on the negative electrode at charging voltages below overcharging, wherein overcharging is caused by applying a voltage higher than that allowable upon charging, causing the risk of internal pressure increase and aberrant exothermic chemical reactions. See the "GUIDELINE FOR SAFETY EVALUATION ON SECONDARY LITHIUM CELLS" (SBA G1101), incorporated by reference by the application at page 14, last paragraph, and incorporated herein as Exhibit A.

The present invention is directed to a secondary battery wherein the capacity of the negative electrode is expressed by the sum of a first component due to the occluding and releasing light metal in the material of negative electrode, and of a second component due to the precipitation of light metal on the surface of the negative electrode. The second component is characterized by a higher charge density than that associated with light metal ion occlusion (page 1, last paragraph, of the present application), thus yielding a secondary battery with higher energy density than in the prior art.

The examples of Table 1, page 28, of the present application illustrate how the battery of the present invention is engineered in order to attain said second component. The batteries feature a negative electrode comprising a graphitic material with a charge capacity of 512 mAh/dm³, and a positive electrode of LiCoCO₂.

The prior art batteries of Comparative Examples 1 and 2 are engineered so that the quantity of graphitic material is sufficient to occlude all of the lithium released by the positive electrode during charging. When the battery is fully charged, therefore, no lithium has deposited on the surface of the negative electrode. In the batteries of Examples 1-7, the relative quantities of positive electrode and negative electrode material are such that a part of the lithium released by the positive electrode cannot be occluded in the negative electrode, and thus deposits as metal on the electrode surface, as confirmed by the Li metal X-ray peak of Figure 3.

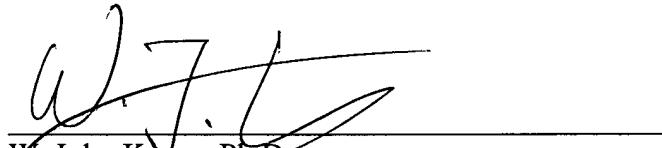
EP '690 specifies thickness of the negative electrode, but this feature alone is not sufficient to determine its charge capacity, since the inherent charge capacity of the electrode material is determined by other characteristics, such as its porosity. In this regard, EP '690 specifically states that said porosity must be higher than that of the positive electrode, so as to prevent "precipitating lithium dendrite", i.e. the formation of lithium metal precipitates, thus teaching away from the subject matter of the present application. See EP '690, paragraphs [0127] and [182].

The prior art battery of EP '690 is therefore not identical in structure to that of the present invention, but rather specifically engineered to avoid the precipitation of lithium metal, which renders it inherently different from the battery of the present application. In light of these differences, the rejection of claims 1-7 is improper, and removal thereof is respectfully requested. The rejection of claims 8-12 is now moot in light of the cancellation of said claims.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 19-3140.

Respectfully submitted,

Sonnenschein Nath & Rosenthal LLP
P.O. Box 061080
Wacker Drive Station, Sears Tower
Chicago, IL 60606
(312) 876-8000


W. John Keyes, Ph.D.
Registration No. 54,218
Agent for Applicants